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INDIANA UNIVERSITY

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Analysis of the Spelling Proficiency of 82,833 Pupils in Grades 2 to 8 in 3,547 Teaching Units of the City Schools in Indiana

By
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and
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Bureau of Cooperative Research and Field Service
School of Education
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MERRILL T. EATON, Assistant Director of the Bureau

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The current literature section of the
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Bureau of Cooperative Research and Field Service
Indiana University

ACKNOWLEDGMENT

THE 1945 State Testing Program had as its principal project the testing of spelling in grades 2 to 12 in all schools in Indiana. Only part of the project is covered in this report, which includes data from grades 2 to 8 in all participating city schools. All state testing projects are fully cooperative in nature, and participation is voluntary with each school. Appreciation is therefore extended to the many superintendents, principals, supervisors, and teachers who have combined their efforts in making this project so successful from the standpoint of efficient coverage and accurate reporting of test results.

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Grateful acknowledgment is extended to Shockley Lockridge, State Representative of the World Book Company; and to Helen M. O'Neill and Margaret Norton, members of the research and publishing staffs of that company, for providing facilities for the distribution of test supplies and the transmittal of test results. The services of these persons far exceeded the commercial interests of the company.

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W.H.F.
M.T.E.

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Analysis of the Spelling Proficiency of 82,833 Pupils in Grades 2 to 8 in 3,547 Teaching Units of the City Schools in Indiana

By
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INTRODUCTION

THE subject of spelling has inspired countless investigations by research workers. These investigations range all the way from the compilation of word lists through frequency of use counts to rigidly controlled experiments in the development of better learning and teaching techniques. The difficulties and inconsistencies of the English language have had an impeding and disorganizing effect upon orthographical precision to the extent that the rote method of learning is apparently the only one applicable in the case of many difficult words. It is the personal opinion of the present investigators that in no other school subject are the effects of retroactive inhibition more likely to be exhibited, and this condition is largely due to the above named vagaries of the language itself.

In the limited length of this bulletin, space does not permit a classification and summary of all past research in ramified phases of the topic. The reader will no doubt be able to find many excellent summaries already extant in current research literature. For what reference is here made to any previous conclusions, we acknowledge our gratitude to at least one conclusive and impeccable summary of the literature.[1] The conclusions from this source have affected the methods both of transmitting and of studying the data in the present study.

The term "spelling proficiency," as it appears in the title of this bulletin, is defined as the ability of a pupil to spell correctly a comparatively short, standardized list of words, selected as being representative of the larger lists recommended for his particular level of instruction. Spelling lists studied in the modern school are made up generally with two purposes in mind: (a) to teach pupils to spell correctly those words which they are making use of in writing at the time of the learning, and (b) to teach words which will appear most frequently in their future writing as adults. Actual frequency and age studies are used to determine what words go into the lists and at what level any particular word appears. The short standardized test, then, consists usually of a random sampling of these word lists and is valid in so far as the original word lists are based upon sound research techniques.

Some objection to such standardized spelling tests is voiced by

[1] Horn, Ernest, "Spelling," in *Encyclopedia of Educational Research* (a publication of the American Educational Research Association), by Walter S. Monroe, Editor, The Macmillan Company, New York, 1941, pp. 1166-1183.

those who point out the impossibility of knowing whether the tested child has had an opportunity to learn the particular words appearing on the tests. In the present study the investigators fail to see much need for anxiety from this type of objection. If the test words are randomly selected from standardized frequency lists, and if sufficient cases are selected to make sure of a representative sampling, then it would appear that the undesirable effects would tend to be averaged out. When used individually, these tests might not have too high validity, but when used on a state-wide basis they would appear to be quite reliable and valid. Likewise, this testing procedure should throw some light on general efficiency of instruction for the state as a whole.

The purpose of this investigation, then, is to analyze and appraise the tested abilities of grade school children in spelling; to determine to what extent factors such as school organization, type of commission, size of enrollment, and number of months in the school year are correlated with tested spelling ability; and to evaluate the effect upon spelling abilities of such factors as the number of days spelling is taught each week, number of minutes in the spelling period, time of day when spelling is taught, subject preceding the spelling lesson, participation in spelling contests, type of spelling unit, use of pretests, emphasis on checking spelling in written work, use of progress charts, emphasis on rules, systematic reviews, and phonetics, and per pupil cost of instruction.

It is fully realized that these are not all the factors entering into successful achievement in spelling. Such factors as the influence of handwriting, incidental learning, tested reading ability, tested intelligence, socio-economic status, sex, and other factors have been completely or almost completely ignored. As an example, it was expected that at each grade level there would be wide individual differences in spelling ability which might be attributed to differences in learning, in experiential background, in quality of teaching, or in all of these factors. Such is usually the rule in the investigation of any phase of achievement.

The deficiencies of the present study in lack of data on factors listed above are somewhat compensated for by the breadth and scope of the data. Whereas previous state testing projects have always been confined to cases from one or two grade levels, the state testing in spelling covered all grades, beginning with grade 2, in all public schools in the state and in the Catholic parochial schools, which participated unanimously. Although no accurate count of all the cases had been made at the time this bulletin was being written, it has been estimated that between 250,000 and 300,000 students have been tested. The present study covers only grades 2 to 8 in the city schools, the number of cases per grade averaging about 12,000 or more.

Past investigations have shown that the learning curve differs from individual to individual, from class to class, and from subject to subject. The present data are adequate to develop learning curves in spelling for retarded and accelerated groups as well as for those who have normal ability. Because of the large numbers of cases, the

hypothesis is tenable that the learning curves here developed are fairly representative of a much broader population. It might not be too radical to assume that the learning curves for other phases of achievement may somewhat parallel those for spelling, especially those parts of the curves which fall above certain maturational levels and, more especially, those for subjects involving a similar type of learning and a similar emphasis in the curriculum.

In order that the reader may gain some comparison between the state spelling project and other state testing projects, the following list of published and unpublished studies is offered:

1. *A Survey of Abilities of High School Seniors in Twenty-one Counties in Indiana (Products of Indiana High Schools)*, State of Indiana, Department of Public Instruction, Research Bulletin No. 2 Testing, Indianapolis, 1942, 46 pp.

2. *A Survey of the Language Arts Achievement of Sixth Grade Children in 18 Counties and Six Cities in Indiana (Products of Indiana Elementary Schools)*, State of Indiana, Department of Public Instruction, Research Bulletin No. 3 Testing, Indianapolis, 1942, 75 pp.

3. *An Analysis of Factors Related to the Language Arts Achievement of Sixth Grade Pupils*, State of Indiana, Department of Public Instruction, Research Bulletin No. 8, Indianapolis, 1944, 82 pp.

4. *A Survey of the Achievement in Arithmetic of 11,348 Sixth Grade Pupils in 486 Schools in Indiana*, Bulletin of the School of Education, Indiana University, Vol. XX, No. 2, Bloomington, March, 1944, 66 pp.

5. *A Survey of the Achievement in Social Studies of 10,220 Sixth Grade Pupils in 464 Schools in Indiana*, Bulletin of the School of Education, Indiana University, Vol. XX, No. 3, Bloomington, May, 1944, 68 pp.

6. *Student Power Inventories of the Indiana High School War Program*, State of Indiana, Department of Public Instruction, Research Bulletin No. 11, Indianapolis, 1944, 137 pp.

7. *An Experiment in Measurement on a County-Wide Basis—The Daviess County, Indiana, Testing Program*, State of Indiana, Department of Public Instruction, Research Bulletin No. 12, Indianapolis, 1944, 32 pp.

8. *The Huntington County Testing Program—The Complete Measurement of All the Pupils in the Huntington County Schools*, 1944, typed.

9. *The Washington, Indiana, Testing Program—An Experiment in Educational Measurement in an Average-Sized City School System*, State of Indiana, Department of Public Instruction, Research Bulletin No. 16, Indianapolis, 1945, 41 pp.

10. *Analysis of the Proficiency in Silent Reading of 15,206 Sixth Grade Pupils in 648 Schools in Indiana*, Bulletin of the School of Education, Indiana University, Vol. XXI, No. 6, Bloomington, November, 1945, 52 pp.

11. *Analysis of the Proficiency in Silent Reading of 11,424 Sophomores in 243 High Schools in Indiana.* Bulletin of the School of Education, Indiana University, Vol. XXII, No. 1, Bloomington, January, 1946, 51 pp.

Cooperative measurement projects now in progress or planned for the immediate future include:

A study to determine the facts a pupil should know in the various subject-matter fields before he is graduated from high school. Data are being collected.

An evaluation of the achievement in music and art of a selected sampling of elementary and high school pupils.

A study of the handwriting ability of a selected sampling of elementary school pupils.

In addition to the present bulletin, the following future publications are planned as studies of spelling: an analysis of spelling proficiency in grades 2 to 8 in the township schools; an analysis of spelling proficiency in grades 2 to 12 in the Catholic parochial schools; an analysis of spelling proficiency in grades 9 to 12 of the township and city schools; and a summary of findings in all these spelling studies.

PROCEDURES

Testing Procedures

In the spring of 1944, the State Testing Committee[2] met and authorized the testing of spelling in grades 2 to 12 as the principal state testing project for the school year 1944-1945. This meeting was held at the request of the State Superintendent of Public Instruction and took place in his offices. Present at the meeting, in addition to the state superintendent, the chairman of the committee, and other committee members, were the advisers on state testing from Indiana University.

After the testing of spelling was authorized, the next step was to discuss the test or tests to be used. This discussion brought out the fact that few, if any, standardized spelling tests have integrated forms covering the entire range of grades from 2 to 12. This difficulty was not considered too acute, however, for it was likewise pointed out that formal instruction in spelling is the exception after grade 8, and that therefore it would be advisable to give the upper grades the same test as that given to eighth graders, and to draw comparisons from the eighth grade norms. After due consideration of most of the available tests, the Stanford Achievement Test Spelling List: Form H[3] was selected on the bases of its wide standardization, its comparable norms from grade to grade, and the fact that it was readily available and usable. The form selected was that which is administered orally rather than the machine-scorable edition, which consists of selecting the correct spelling from a choice of spellings for each particular word. Figure 1 is a reproduction of the word lists for each grade, and also includes the directions for administering the test. It will be noted that there are 40 words in the second grade list and 50 words in the list for each of the other grades. The words are arranged in statistical order of difficulty and each list overlaps several other lists.

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[2] For a list of the personnel of this committee, see the Acknowledgment, page 3.
[3] Published by the World Book Company, Yonkers-on-Hudson, 1943.

STANFORD ACHIEVEMENT TEST

SPELLING LIST: FORM H — FOR ALL BATTERIES

Note that second-grade pupils are given only words 1 to 40, third-grade pupils words 1 to 50, fourth-grade pupils words 11 to 60, fifth-grade pupils words 21 to 70, sixth-grade pupils words 31 to 80, seventh-grade pupils words 41 to 90, and eighth- and ninth-grade pupils 51 to 100. In the case of Grades 4, 5, 6, 7, 8, and 9, the words are to be read as though they were numbered 1 to 50. Read the number of each word and caution pupils to write the word on the line that has the number of that word.

	Second and third grades start here.		
1.	*is*	Your coat isn't here, but your hat **is**.	*is*
2.	*me*	It is mine; give it to **me**.	*me*
3.	*do*	Please **do** come to my party.	*do*
4.	*you*	Are you ready for school?	*you*
5.	*look*	Before crossing a street, **look** both **ways**.	*look*
6.	*way*	Which **way** did the car turn?	*way*
7.	*his*	He calls his dog "Spot."	*his*
8.	*have*	Large houses have many rooms.	*have*
9.	*but*	It is heavy, **but** I can lift it.	*but*
10.	*was*	I **was** sick yesterday.	*was*
	Fourth grade starts here. (Call these words numbers 1 to 50 instead of 11 to 60.)		
11.	*tell*	Never **tell** a secret.	*tell*
12.	*belong*	Does this kitten **belong** to you?	*belong*
13.	*game*	We played a **game** called "pull-away."	*game*
14.	*two*	The next number after one is **two**.	*two*
15.	*deep*	The water in the ocean is very **deep**.	*deep*
16.	*town*	A city is larger than a **town**.	*town*
17.	*upon*	Once upon a time there were no railroads.	*upon*
18.	*hard*	Wood is not so **hard** as iron.	*hard*
19.	*faster*	Airplanes go **faster** than trains.	*faster*
20.	*place*	I lost my **place** in the book.	*place*
	Fifth grade starts here. (Call these words numbers 1 to 50 instead of 21 to 70.)		
21.	*standing*	Is the horse lying down or **standing** up?	*standing*
22.	*add*	To find the sum of two numbers we **add**.	*add*
23.	*kind*	Children should be **kind** to their pets.	*kind*
24.	*river*	We crossed the **river** in a boat.	*river*
25.	*our*	Please come over and play at **our** house.	*our*
26.	*spring*	The door is held shut by a **spring**.	*spring*
27.	*city*	This town is almost as large as a **city**.	*city*
28.	*cool*	A little ice will cool the water.	*cool*
29.	*care*	You should take good **care** of your pets.	*care*
30.	*were*	They **were** here, but they are gone now.	*were*
	Sixth grade starts here. (Call these words numbers 1 to 50 instead of 31 to 80.)		
31.	*wide*	This room is 15 feet long and 10 feet **wide**.	*wide*
32.	*finger*	Put the ring on my little **finger**.	*finger*
33.	*leg*	The knee is part of the **leg**.	*leg*
34.	*riding*	Horseback **riding** is excellent exercise.	*riding*
35.	*kisses*	There were many **kisses** as they said good-by.	*kisses*
36.	*early*	Seven o'clock is **early** in the morning.	*early*
37.	*paint*	Do you like to **paint** with water colors?	*paint*
38.	*iron*	Stoves are made of **iron**.	*iron*
39.	*washed*	Mother **washed** clothes on Monday.	*washed*
40.	*catch*	Can you **catch** the ball with one hand?	*catch*
		Second grade stops here.	
	Seventh grade starts here. (Call these words numbers 1 to 50 instead of 41 to 90.)		
41.	*nearer*	The moon is **nearer** to us than the sun.	*nearer*
42.	*says*	The sign says, "Slow, dangerous!"	*says*
43.	*learned*	Have you **learned** to skate on ice yet?	*learned*
44.	*stayed*	We **stayed** in a hotel for three days.	*stayed*
45.	*lately*	Where have you been **lately**?	*lately*

(*Spelling List continued on reverse side*)

Published by World Book Company, Yonkers-on-Hudson, New York, and Chicago, Illinois Edition G
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SPELLING LIST: FORM H — *Continued*

46.	*animal*	What **animal** do you like best for a pet?	*animal*
47.	*taste*	I do not like the **taste** of olives.	*taste*
48.	*potatoes*	I like mashed potatoes and gravy.	*potatoes*
49.	*garage*	We keep our car in a neighbor's **garage**.	*garage*
50.	*quiet*	It was so **quiet** you could hear a pin drop.	*quiet*
		Third grade stops here.	
	Eighth and ninth grades start here. (Call these words numbers 1 to 50 instead of 51 to 100.)		
51.	*valley*	The river **valley** lies between two hills.	*valley*
52.	*settled*	The rain cooled the air and **settled** the dust.	*settled*
53.	*butcher*	How much does the butcher charge for beef?	*butcher*
54.	*remembering*	Are you **remembering** my birthday?	*remembering*
55.	*result*	A broken arm was the **result** of her fall.	*result*
56.	*arrived*	The train **arrived** at the station at 7 : 20.	*arrived*
57.	*telegram*	Sending a **telegram** is usually quicker than writing a letter.	*telegram*
58.	*library*	Our **library** has more than a thousand books.	*library*
59.	*humor*	I see no **humor** in that joke.	*humor* (*ends humour*)
60.	*cashier*	A **cashier** handles money in a bank.	*cashier*
		Fourth grade stops here.	
61.	*course*	The ship changed its **course** from north to **east**.	*course*
62.	*accept*	I shall **accept** your invitation with pleasure.	*accept*
63.	*encourage*	Praise will often **encourage** a pupil.	*encourage*
64.	*desiring*	Those **desiring** to go may leave now.	*desiring*
65.	*source*	Clouds are the **source** of rain.	*source*
66.	*type*	John is not the **type** of boy to **steal**.	*type*
67.	*planning*	We are **planning** a school party for Halloween.	*planning*
68.	*practicing*	Helen is **practicing** on the piano.	*practicing* (*ends practising*)
69.	*talent*	His paintings show unusual **talent**.	*talent*
70.	*appearance*	His sudden **appearance** frightened me.	*appearance*
		Fifth grade stops here.	
71.	*label*	The **label** on the can says "String Beans."	*label*
72.	*succeeded*	After three failures, Bobby **succeeded**.	*succeeded*
73.	*acknowledge*	This note will **acknowledge** your letter.	*acknowledge*
74.	*favorably*	His request was acted upon **favorably**.	*favorably*
75.	*gradually*	Ice **gradually** changes into water.	*gradually*
76.	*exhibit*	We saw an **exhibit** of animal pictures.	*exhibit*
77.	*physical*	The doctor gave me a **physical** examination.	*physical*
78.	*necessary*	Food, air, and water are **necessary** to keep us alive.	*necessary*
79.	*specially*	An acrobat is **specially** strong.	*specially*
80.	*preliminary*	A short talk was **preliminary** to the main address.	*preliminary*
		Sixth grade stops here.	
81.	*administrator*	The **administrator** managed the business well.	*administrator*
82.	*cordial*	His manner is agreeable and **cordial**.	*cordial*
83.	*necessity*	Sunshine is a **necessity** for good health.	*necessity*
84.	*immediate*	This letter requires an immediate reply.	*immediate*
85.	*familiar*	His face is **familiar**; where did I meet him?	*familiar*
86.	*acquainted*	Are you **acquainted** with the new girl yet?	*acquainted*
87.	*quantities*	A locomotive burns large **quantities** of coal.	*quantities*
88.	*prior*	I cannot go because I have a prior engagement.	*prior*
89.	*correspondent*	We write letters to and receive letters from a **correspondent**.	*correspondent*
90.	*convenient*	A kitchen table should be convenient to the stove and pantry.	*convenient*
		Seventh grade stops here.	
91.	*recommendation*	Write me a letter of **recommendation** for the job.	*recommendation*
92.	*congressional*	The **congressional** vote was a tie.	*congressional*
93.	*achievement*	The discovery of the North Pole was a great **achievement**.	*achievement*
94.	*immense*	An iceberg is an **immense** piece of ice.	*immense*
95.	*analysis*	The chemist's **analysis** showed the water to be pure.	*analysis*
96.	*appendicitis*	John had an **appendicitis** operation today.	*appendicitis*
97.	*peculiarities*	One of the **peculiarities** of the giraffe is its long neck	*peculiarities*
98.	*kindergarten*	Children under six go to **kindergarten**.	*kindergarten*
99.	*tragedy*	A sudden death is always a **tragedy**.	*tragedy*
100.	*accidentally*	He was **accidentally** injured by a falling brick.	*accidentally*
		Eighth and ninth grades stop here.	

Fig. 1. Stanford Achievement Test Spelling List: Form H

Two general meetings of school administrators were called in August, one at Peru for the northern section of the state, and one at Bedford for the southern section. These meetings were for the purpose of acquainting administrators with the proposed project and of getting their reaction. It is significant that no previous state testing project had created such interest and enthusiasm. All were in favor of the proposal, and a high degree of cooperation was assured. Later in the fall a complete outline of the details was presented at six regional administrators' meetings held throughout the state.

The date of testing was set for December 10, 1944, but, because of difficulties in printing and distributing the tests, this date was later changed to February 9. About the first of December a bulletin was sent out by the State Department of Public Instruction drawing attention to the date of testing and listing the answers to questions which were anticipated covering supplies and general administration.

In the meantime, work went forward on developing a suitable transmittal form on which to send the data to the University for processing. Figure 2 is a reproduction of this form. In addition to the usual information recorded for each pupil tested, the form also allowed for visual and audiometric ratings.

Figure 3 is a reproduction of the reverse side of the transmittal form. On this were listed the steps to be carried out in the project, and basic forms for listing information concerning the groups to be tested. The test publishers printed this transmittal form, together with a single sheet containing tables of equated scores, a grade placement chart, and norms. These materials were distributed at a very reasonable cost, with the word lists and spelling blanks, to each school on order.

The teachers of each unit were delegated the task of giving the tests, scoring the tests, and preparing the transmittal sheets. Superintendents and principals were to supervise this part of the project, and to be responsible for seeing that the program was carried out uniformly and that the results were sent to the University.

The following is a list of participating school systems whose data are included in this report:

Alexandria
Angola
Attica
Auburn
Batesville
Bedford
Berne
Bicknell
Bloomington
Bluffton
Brazil
Brook and Iroquois Township
Brookville
Brownstown
Butler
Cambridge City and Jackson Township
Cannelton
Carbon
Center Point
Clinton
Columbia City
Connersville
Converse
Corydon
Crawfordsville
Crown Point
Decatur
Delphi-Deer Creek Township
Dunkirk
East Gary
Edinburg
Elwood
English and Sterling Township
Evansville
Fairmount and Fairmount Township
Franklin
French Lick
Garrett
Gary
Gas City
Goshen
Greencastle
Greendale

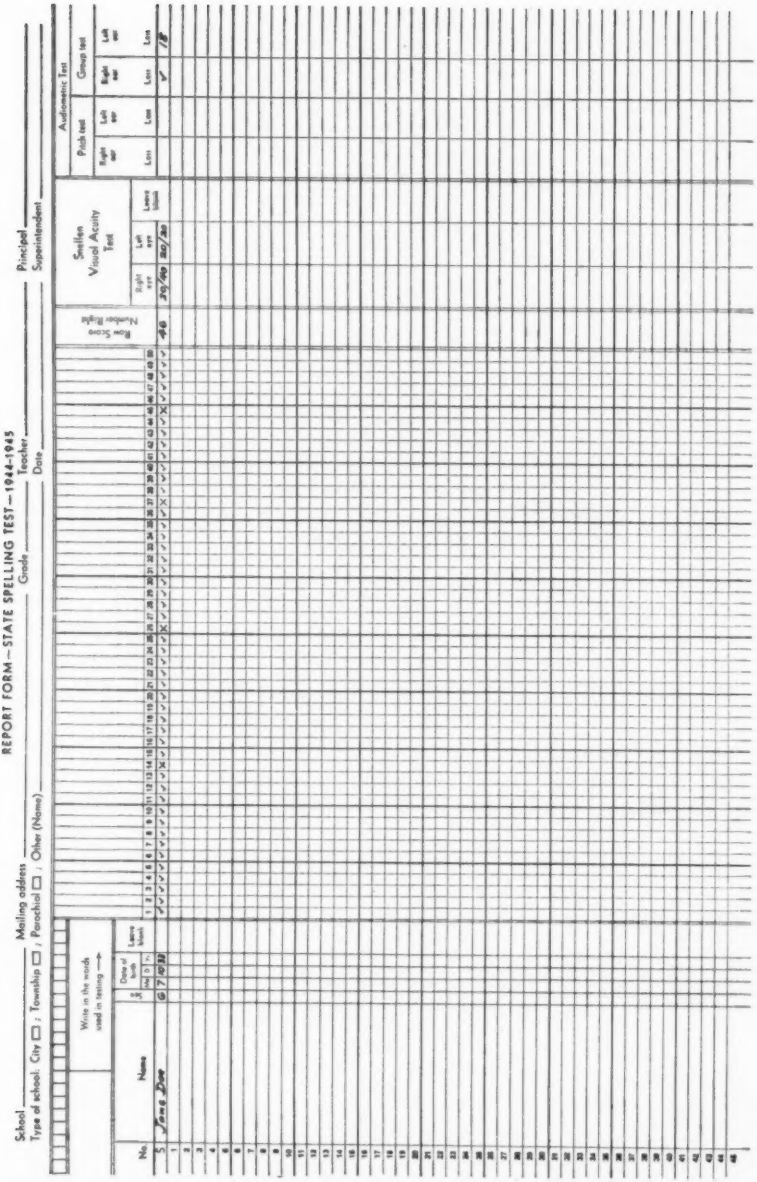

Fig. 2. Report form for the state spelling test

INDIANA STATE TESTING PROGRAM—SPELLING

Steps in Carrying Out the Program

1. On the day of testing provide each test administrator with a copy of the word list, a copy of this report form, and sufficient copies of the spelling answer sheets for the class to be tested. Each of Grades II-VII should be tested separately. Grades VIII-XII are measured with the same test, and may be combined into larger units.
2. A separate report form must be executed for each room, and for each grade and half-grade. For example, VI A and VI B may be tested together, but the reports for these grades must appear on separate forms. Where a particular grade is housed in more than one room, separate reports must be executed for each room. For the larger departmentalized classes in Junior and Senior High School, use enough forms to report the entire class at each level. These may be stapled together, with basic information listed on the top form.
3. Administer the tests. *The Stanford Spelling test requires approximately 15 minutes, allowing all pupils time to write each word. The teacher pronounces the word, then reads a sentence in which it is used, then pronounces the word again (first explaining this procedure, and cautioning pupils to write each word by the right number).*
4. Score individual papers. The Spelling List may be used as a key. In scoring, capitalization is entirely disregarded; likewise undotted i's or uncrossed t's where it is clear that these letters are intended. Pupils should not be penalized for poor handwriting. Count number right to get Raw Score. Refer to Norm sheet, Table 1 to get Equated Score corresponding to that Raw Score, and Table 2 to get Grade Equivalent corresponding to the Equated Score.
5. Fill in the information at the top of the reverse side of this form.
6. Write in the words used in testing the pupils whose names appear on this form.
7. Before executing steps 8-14, observe the sample which appears just above the space for pupil No. 1 on the reverse side of this page.
8. Write in the name of each student.
9. List the sex for each student, using "B" for boy and "G" for girl.
10. List the birth date (month — day — year) for each student.
11. Indicate with an (×) the words misspelled and a (✓) the words spelled correctly. This is important for tabulation purposes.
12. List the spelling *Raw* Score (No. Right), not the Equated Score, for each student.
13. List visual acuity rating for the right and left eye of each pupil. If the pupil wears glasses, list the rating *with glasses*. If no ratings are available, leave this space blank.
14. Record audiometric test results as follows: Where both group test and pitch test records are available record only the *pitch* test results. In this case, average the losses in the frequencies 256, 512, 1024, and 2048 for each ear, ignoring the other frequencies. Record the average loss for each ear as indicated. If the pupil took only the group test, record as follows: (a) indicate by a (✓) if the pupil passed the test with either or both ears; (b) mark the hearing line if the pupil failed in either or both ears. The sample shows that (1) the pupil had taken only the group test, (2) the right ear was passed, (3) the hearing line showed a loss of 18 in the left ear.
15. Check the basic information asked for at the bottom of this page.
16. Place folded forms in a flat envelope and mail to: W. H. Fox
    Bureau of Cooperative Research
    Alpha Hall — Room 100
    Indiana University, Bloomington, Indiana

BASIC INFORMATION

Check each of the following items as it applies to the class reported on the reverse side of this form.

1. Spelling is taught on the following days: Mon. ☐; Tues. ☐; Wed. ☐; Thurs. ☐; Fri. ☐.
2. The average number of minutes in each period devoted to spelling is: 5 ☐; 10 ☐; 15 ☐; 20 ☐; 30 ☐; 40 ☐; more than 40 ☐.
3. The time of day in which the spelling period falls is: 8:00-10:00 ☐; 10:00-12:00 ☐; 1:00-2:30 ☐; 2:30-4:00 ☐; time varies from day to day ☐.
4. In the daily program, the subject preceding spelling is Reading ☐; other Language Arts ☐; Mathematics ☐; Social Studies ☐; Music or Art ☐; Health and Safety ☐; Science ☐; Physical Education ☐; other (*name*) ..... Spelling is first ☐; preceding subject varies ☐.
5. The pupils listed on this form have had the opportunity of participating in local ☐, county ☐, regional ☐, other ☐, no ☐ spelling contests.
6. The type of unit used in teaching spelling is daily ☐; weekly ☐; monthly ☐; semester ☐; other (*name*) .....
7. Spelling is taught as a separate subject ☐ or, in connection with Language Arts ☐; in connection with English ☐; in connection with Commercial subjects ☐; other ☐.
8. The textbook used in spelling is the State-adopted text ☐; other (*name*) .....; no text is used ☐.
9. The children are pretested to determine what words need to be stressed. Yes ☐; No ☐.
10. Spelling is checked in all ☐, some ☐, none ☐ of the written work handed in by pupils.
11. Progress charts are used in motivating the pupil in Spelling. Yes ☐; No ☐.
12. For these pupils, the teacher of spelling emphasizes no rules ☐; only general rules ☐; rules as they apply ☐; few rules ☐; many rules ☐.
13. Planned, systematic reviews are held. Yes ☐; No ☐. Some reviews are held but not systematized ☐.
14. In the primary reading program for these pupils, phonetics were heavily stressed ☐; moderately stressed ☐; stressed not at all ☐.
15. List briefly the plan followed for individual study in spelling.

    .....
    .....
    .....
    .....

16. List briefly the plan for providing for individual differences in spelling ability.

    .....
    .....
    .....
    .....

Fig. 3. Reverse side of report form for the state spelling test

Greensburg
Greenwood
Griffith
Hagerstown-Jefferson Township
Hamlet-Davis Township
Hartford City
Hobart
Huntingburg
Huntington
Jasonville
Jasper
Jonesboro
Kendallville
Kokomo
La Porte
Lawrenceburg
Lebanon
Liberty-Center Township
Ligonier
Linton
Logansport
Loogootee
Madison
Marengo and Liberty Township
Marion
Martinsville
Middlebury Joint Town and Township
Middletown and Fall Creek Township
Milltown and Whiskey Run Township
Mishawaka
Monticello
Montpelier City and Harrison Township Joint
Mooresville
Muncie
Munster
Nappanee
New Castle
Noblesville
North Manchester
North Vernon
Oakland City-Columbia Township Consolidated
Odon-Madison Township
Pendleton
Peru
Petersburg
Portland
Princeton
Rensselaer
Richmond
Rochester
Rockport
Rockville
Rushville
Scottsburg-Vienna Township Joint
Seymour
Shelbyville
South Bend
Speedway
Sullivan
Sunman
Terre Haute
Tipton
Valparaiso
Veedersburg
Vevay
Vincennes
Wabash
Walkerton-Lincoln Township
Warsaw
Whiting
Williamsport
Winamac
Winchester
Worthington-Jefferson Township

Tabulation Procedures

The data began arriving at the University shortly after the date of testing and continued to come as late as four months after this date. The processing of this mass of data was begun July 1, 1945. Processing has proceeded since then at a steady rate and will probably take as much as nine months to complete. Steps in this process were as follows:

1. Each school was assigned a code number and its data were filed according to number.
2. Each item of basic information was coded by number.
3. Other available information for each school was obtained from the *Indiana School Directory* and from publications of the Indiana State Teachers Association. This information was likewise coded.
4. Each pupil's score was punched on a Hollerith card, together with school identification number, unit, and grade. Since the Hollerith card contains 80 columns, skip bars were utilized in order to tabulate the scores of 8 pupils on each card.
5. The individual scores were then tabulated by grade, school, and unit.

6. Grade equivalent limits were arbitrarily set as .4 on either side of the test norm for the grade at the date of testing. This meant, for example, that in grade 2A any grade equivalent of 2.0 to 2.9 would be considered as normal achievement since 2.5 was the norm for this grade. Any grade equivalent above this range was considered as accelerated achievement, while any grade equivalent below this range was considered retarded. The B classes were similarly treated, except that the limits were moved down .5 grade.

7. Modal type norms were used. These norms differ from the traditional type in that they are computed for pupils who are at age for grade at the time of testing, and they therefore represent a somewhat more ideal objective of successful achievement.

8. Master sheets were constructed which contained the following: school identification number, coded basic information, coded school information, grade and unit, and number of pupils, total score, mean score, and grade equivalent of the mean, for retarded, accelerated, normal, and total pupils tested.

9. The data on these master sheets were then punched on Hollerith cards, and from these cards the study was made.

In this study primary emphasis was placed on the administrative groups and units rather than upon the school or the city as a whole. In accordance with long-standing precedent in reporting state testing results, each participating school receives a personal communication listing averages and grade equivalents for each unit, for each school, and for the city as a whole. The smaller unit and gross totals remain the primary objective of this study. These units range in size for each grade from one or two students in some of the B classes in smaller schools to several hundred in the larger departmentalized junior high schools.

It is well recognized that this report only scratches the surface in exhausting the possibilities for studying the data. Therefore, it is planned to continue the study of these data for several years to come. Subsequent reports will likely be made in journals and periodicals, since they will incorporate research which is of interest to education in general.

FINDINGS

Two approaches were used in attempting the study of data concerning grades 2 to 8 in city schools. It was desirable, first, to make an observation of spelling progress from grade to grade, and, second, to study the relationship between other measurable items of school data and measured spelling proficiency. In making the first study, the grades were divided into half-grade units; for the second, they were thrown into one large unit.

Results by Separate Grades

Table I shows the total number of units reported in each half grade, and the number of these units which included retarded, normal, and accelerated pupils. This table also lists the average size of each unit and the total cases, per cent of cases, mean score, grade equivalent of the mean, and average deviation from the expected norm for each classification and each grade.

TABLE I. NUMBER AND AVERAGE SIZE OF UNITS IN EACH GRADE, NUMBER OF CASES, PER CENT OF GRADE, MEAN SCORE, MEAN GRADE EQUIVALENT, AND AVERAGE PUPIL DEVIATION IN ALL GRADES INCLUDED IN THE STUDY AND IN ALL GRADES HAVING RETARDED, NORMAL, OR ACCELERATED STUDENTS

Grade	Retarded							Normal							Accelerated							Total						
	Number of Units	Average Size of Units	Number of Cases	Per Cent of Grade	Mean Score	Mean Grade Equivalent	Average Pupil Deviation	Number of Units	Average Size of Units	Number of Cases	Per Cent of Grade	Mean Score	Mean Grade Equivalent	Average Pupil Deviation	Number of Units	Average Size of Units	Number of Cases	Per Cent of Grade	Mean Score	Mean Grade Equivalent	Average Pupil Deviation	Number of Units	Average Size of Units	Number of Cases	Per Cent of Grade	Mean Score	Mean Grade Equivalent	Average Pupil Deviation
2B	60	3	277	20	2.2	1.3	- .7	90	10	911	66	10.7	1.9	- .1	46	2	188	14	26.1	3.0	+1.0	93	15	1,376	2	11.1	1.9	- .1
2A	419	8	3,843	37	7.7	1.7	- .8	442	10	4,409	43	18.4	2.4	- .1	364	5	2,004	20	31.4	3.3	+ .8	450	23	10,256	12	16.7	2.3	- .2
3B	143	7	1,135	50	12.4	2.0	-1.0	144	5	723	31	26.4	3.0	0	113	3	425	19	40.2	4.0	+1.0	154	15	2,283	3	22.0	2.6	- .4
3A	415	9	3,952	39	17.4	2.3	-1.2	420	8	3,351	33	33.7	3.5	0	402	7	2,771	28	44.5	4.4	+ .9	427	24	10,074	12	30.3	3.2	- .3
4B	130	6	849	40	11.4	3.0	-1.0	136	5	770	36	27.1	4.0	0	121	4	503	24	38.9	5.0	+1.0	140	15	2,122	3	23.6	3.8	- .2
4A	369	10	3,918	41	17.1	3.3	-1.2	392	8	3,218	34	33.7	4.5	0	377	6	2,346	25	42.5	5.7	+1.2	400	24	9,482	11	29.0	4.1	- .4
5B	129	8	1,037	57	15.3	3.8	-1.2	123	4	486	26	30.6	4.9	- .1	99	2	309	17	40.6	6.3	+1.3	130	14	1,832	2	23.6	4.4	- .6
5A	395	11	5,383	56	21.1	4.2	-1.3	376	5	1,806	19	35.5	5.4	- .1	374	6	2,462	25	43.4	7.2	+1.7	398	24	9,653	12	29.5	4.8	- .7
6B	130	9	1,134	63	16.2	4.6	-1.4	113	3	399	22	31.2	5.9	- .1	108	2	273	15	40.4	7.7	+1.7	132	14	1,806	2	23.2	5.1	- .9
6A	363	13	4,695	51	19.8	4.9	-1.6	348	5	1,800	20	34.5	6.4	- .1	346	7	2,640	29	42.6	8.6	+2.1	366	25	9,135	11	29.3	5.7	- .8
7B	96	15	1,401	60	14.9	5.2	-1.8	88	4	422	18	29.8	7.0	0	83	5	510	22	39.6	8.9	+1.9	96	24	2,333	3	23.0	5.9	-1.1
7A	331	16	5,213	52	18.0	5.5	-2.0	313	5	1,764	17	32.5	7.3	- .2	317	9	3,139	31	41.6	9.6	+2.1	331	30	10,116	12	27.8	6.6	- .9
8B	105	17	1,784	69	15.0	5.9	-2.1	89	3	273	11	30.9	8.1	+ .1	93	4	518	20	39.4	9.6	+1.6	105	25	2,575	3	21.6	6.6	-1.4
8A	323	17	5,412	56	18.3	6.2	-2.3	308	5	1,687	17	33.5	8.4	- .1	307	4	2,691	28	42.1	10.3	+1.8	325	30	9,790	12	27.5	7.4	-1.1
Total	3,428	11	40,033	46			-1.5	3,382	6	22,021	27			- .1	3,150	6	20,779	25			+1.6	3,547	23	82,833	100			- .6

Grade 2B.—Ninety-three units of 2B's were reported, with a total of 1,376 pupils, averaging 15 pupils to a unit. This total represented 2 per cent of all the city school pupils reported in grades 2 to 8. The mean score of 11.1 for all 2B pupils gave a state grade equivalent of 1.9, which was .1 grade below the national norm for these pupils at the time of testing. Thus, it appears that Indiana city school pupils start out retarded, since formal instruction in spelling must have begun for most of them just prior to the date of testing. However, it is also possible that an administrative policy of general retardation at this school level is responsible for the underachievement of this group, since the B units at mid-year would ordinarily include retained pupils of low ability.

Of the 93 units, 60 listed retarded pupils. The total number of retarded pupils was 277, or 20 per cent of all cases reported at the 2B level. The mean score of 2.2 gave a mean grade equivalent of 1.3, or an average spelling retardation of .7 grade per pupil.

Normal pupils were found in all except three of the 93 units, the 911 pupils in this classification representing 66 per cent of all cases reported at this level. The mean score of 10.7, with corresponding grade equivalent of 1.9, showed that even the distribution of those with normal scores was positively skewed.

About one half of the 2B units had at least 1 accelerated student each, but the average size of 2 accelerated pupils to the unit showed that few units were highly accelerated. The 188 accelerated pupils represented 14 per cent of those reported at this level. On the average, they were a whole grade accelerated in this aspect of achievement.

Grade 2A.—In grade 2A of the city schools 450 units, with 10,256 cases, were reported. The fact that the average size of the unit was 23, or 8 pupils more than that in the average 2B unit may be an indication of a growing tendency to eliminate mid-year promotions. These pupils, representing 12 per cent of all cases in this part of the study, had a mean score of 16.7, with a corresponding grade equivalent of 2.3. On the average, they were .2 grade under the national norm, and were .1 grade more retarded than the pupils in grade 2B.

Among the 450 units, 419 included retarded pupils. In all, an average of 8 pupils to the unit, or 37 per cent, had grade equivalents lower than .4 grade below the norm. The mean score grade equivalent showed that on the average these pupils were .8 grade under expectation.

The 4,409 pupils who fell into the normal range represented 43 per cent of all cases at this grade level. Only 8 schools had no normal pupils. The mean score grade equivalent of 2.4 showed again that more pupils were below than above the norm of 2.5, even though the criterion of normal tested achievement represented a rather liberal range of from 2.1 to 2.9.

Twenty per cent of the grade, 2,004 pupils, were accelerated in tested spelling achievement. About 1 unit in 5 had no accelerated pupils. On the average, these pupils were .8 of a grade above the norm, which was not as good as the average for those in either grade 2B or grade 3B.

Grade 3B.—The 154 units reporting at the 3B level represented 2,283 cases, or about 3 per cent of all city pupils in grades 2 to 8. The average size of the unit was 15, which conformed very closely with the average size of all B groups in grades 2 to 6. These pupils had an average grade equivalent of 2.6, which showed the average retardation to be .4 grade. A vertical glance down the average pupil deviation column reveals that this level presented a modal low point in tested spelling achievement for grades 2B to 4B, inclusive. Further investigation is suggested, in order to determine whether this phenomenon is accounted for by administrative policies in school progress, teaching methods, teaching efficiency, or other factors.

The 1,135 retarded cases made up about half of all the 3B's reported. Only 11 of the 154 units failed to have at least 1 retarded pupil. On the average these pupils were a whole grade low in tested achievement.

Only 31 per cent, or 723 cases in 144 units, were what was considered as normal.

About 1 in 5 pupils at this level were accelerated, although slightly fewer than 1 in 5 of the units reported no accelerated pupils. The accelerated pupils averaged a whole grade above the norm.

Grade 3A.—Four hundred and twenty-seven 3A units, averaging 24 pupils per unit and including a total of 10,074 cases, were reported. These constituted 12 per cent of all the city school pupils reported in grades 2 to 8. The mean score grade equivalent of 3.2 showed that the average retardation at this level was .3 grade. This retardation was less than that for the 3B's but greater than that for either the 2B's or 2A's.

Of the 427 units, 415 reported retarded pupils. About 39 per cent of this grade, 3,952 cases, fell in this classification. On the average these pupils were retarded 1.2 grades. About 33 per cent, or 3,351 cases, were classified as normal—7 units reported no normal cases—and about 28 per cent, 2,771 cases, were classified as accelerated. On the average, those who were accelerated were .9 grade above the norm. Twenty-five of the 427 units had no accelerated cases.

Grade 4B.—At the 4B level, 140 units reported 2,122 cases, an average of 15 cases per unit. This number of cases constituted 3 per cent of the city school students in grades 2 to 8. The mean score grade equivalent of 3.8 showed an average pupil deviation from the norm of .2 grade, which was less than that for either the 3B's or the 3A's, the same as that for the 2A's, but larger than that for the 2B's.

Only 10 units at this level reported no retarded pupils. The 849 retarded cases constituted 40 per cent of the 4B's and, on the average, were retarded 1.0 grade. Only 4 units reported no normal pupils. The 770 normal cases constituted 36 per cent of the grade. Nineteen of the 140 units reported no accelerated pupils. The 503 accelerated pupils made up 24 per cent of the grade and had an average grade equivalent deviation of 1.0 above the norm.

Grade 4A.—In grade 4A, 9,482 cases were reported in 400 different units. These amounted to about 11 per cent of all tested city school pupils in grades 2 to 8. The average size of the unit was 24. The mean score grade equivalent was 4.1, which was .4 grade below the norm on the average. This deviation equalled that for 3B's and exceeded that for all other lower grades.

In 389 of the 400 units there were retarded pupils. A total of 41 per cent of the pupils at this level were retarded and, on the average, each pupil was retarded 1.2 grades. In all except 8 of the units there was at least one normal pupil. The total of 3,218 normal cases constituted 34 per cent of the pupils at this level. In 377 of the 400 units there were accelerated pupils. The 2,346 accelerated pupils made up 25 per cent of the city school 4A's, and they averaged 1.2 grades above the norm in tested ability.

Grade 5B.—The 130 units of 5B's reported included 1,832 cases, an average of 14 cases per unit. Pupils at this level made up 2 per cent of the tested city school pupils in grades 2 to 8. The mean score grade equivalent of 4.4 (the state norm) showed that the average pupil in this grade was .6 grade below the national norm. This was a retardation which exceeded any grade below the level of 5B.

All but one of the units reported retarded pupils. The 1,037 retarded cases were 57 per cent of those tested at this level. On the average those in this classification were 1.2 grades below the norm. All but 7 units reported some normal cases, but the 486 cases in this classification were only 26 per cent of the cases at this grade level. Thirty-one of the 130 units had no accelerated pupils. The 309 pupils who were accelerated made up only 17 per cent of the grade, but they averaged 1.3 grades above the norm.

Grade 5A.—There were 398 units of 5A pupils tested, totaling 9,653 cases, an average of 24 cases per unit. This made up 12 per cent of all the city school cases in grades 2 to 8. These 5A's had an average grade equivalent of 4.8, which was .7 grade below the norm. This deviation from the norm was larger than that of any grade lower than the 5A level.

One third of the units reported no cases of retarded spellers. The total of 5,383 cases in this classification made up 56 per cent of those at this level. On the average these retarded pupils ranked 1.3 grades below the norm. Twenty-two of the 398 units had no normal spellers. The number of normal spellers totaled 1,808, which was only 19 per cent of the group. On the other hand, 25 per cent of the 5A's were accelerated, and the average acceleration was 1.7 grades. The figures show that the averages for retarded and accelerated 5A's differed by 3.0 grades.

Grade 6B.—The 1,806 6B students tested in city schools came from 132 units, and averaged 14 to the unit. The average grade equivalent for 6B's was 5.1, which was .9 grade below the norm. Only 2 per cent of the city school pupils tested in grades 2 to 8 fell in this grade level.

The 1,134 retarded pupils at this level came from 130 of the 132 units, and constituted 63 per cent of the tested 6B's. The retarded spellers averaged 1.4 grades below the norm. Nineteen of the reported units had no normal spellers. Normal spellers totaled 399, or 22 per cent of the grade. Only 108 of the 132 units had any accelerated pupils. The 273 accelerated cases made up 15 per cent of the grade, and were 1.7 grades above the norm on the average. The spread between the average grade equivalents for retarded and accelerated cases was slightly more than 3.0 grades.

Grade 6A.—About 11 per cent of the tested city school pupils were in the 6A grade. These came from 366 units, with a total enrollment of 9,135. On the average, the 6A's were .8 grade below the norm. This showed slightly less retardation than was evidenced for 6B's, but exceeded that of all lower grades.

All except 3 of the 6A units had some retarded pupils. The total number of cases in this classification was 4,695, or 51 per cent of those reported at this level. The average retardation per pupil was 1.6 grades. There were 1,800 normal 6A's—20 per cent of the whole grade—reported from 348 of the 366 units. Only 20 units failed to show any accelerated cases. In all, 2,640 pupils, or 29 per cent of the grade, fell in this classification. The average grade equivalent of accelerated 6A's was 8.6, which was 2.1 grades above the norm. The range in averages between the retarded and accelerated pupils was 3.7 grades.

Grade 7B.—About 3 per cent of the tested city school students in grades 2 to 8 were listed as 7B's. In the 96 units there was a total of 2,333 cases, or an average of 24 cases to the unit. The mean average grade equivalent was 5.9. Thus the state norm fell 1.1 grades below expectation. This tested achievement level was lower than that for any grade below the 7B level.

Every 7B unit had at least one retarded pupil. The 1,401 retarded pupils constituted 60 per cent of the grade, and their average grade equivalent was 1.8 grades below the norm. In 88 of the 96 units, 422 pupils, or 18 per cent, were reported as normal. Thirteen groups had no accelerated cases. The 510 accelerated cases constituted 22 per cent of those at this level, and had an average grade equivalent of 8.9, or 1.9 grades above the norm. The range between averages for the retarded and accelerated cases was 3.7 grades.

Grade 7A.—The data showed 10,116 city school students in grade 7A, or about 12 per cent of all city school students tested. These students came from 331 different units. On the average, their scores showed a grade equivalent of 6.6, which was .9 grade below the norm for the time of testing. This retardation was somewhat less than that exhibited in the data for 7B's, but exceeded that exhibited in the data of all other lower grades.

All of the 7A units reported at least one retarded student. The total number of retarded students was 5,213, or 52 per cent, of all the cases at this level. On the average, the retarded students were 2.0 grades below the norm. The 1,764 students classified as normal

came from 313 of the 331 units and made up 17 per cent of the cases in grade 7A. The 3,139 students classified as accelerated came from 317 of the 331 units and made up 31 per cent of the cases. On the average, the accelerated cases were 2.1 grades above the norm. The range between averages for the retarded and accelerated cases was 4.1 grades.

Grade 8B.—The 105 units of 8B city school students had a total enrollment of 2,575 and an average enrollment of 25 in each unit. This number was about 3 per cent of all city school students tested in grades 2 to 8. The grade level reached by these students was 6.6, which was 1.4 grades below the norm. This was the highest exhibited average amount of retardation for any grade in the study.

Every 8B unit had at least one retarded student. Pupils retarded numbered 1,784 and constituted 69 per cent of the 8B's. Their average grade deviation was 2.1. Sixteen units had no normal students. Normal students made up a total of 273, which was only 11 per cent of all students at this level. About 20 per cent of the 8B's, 518 in all, from 93 of the 105 units were accelerated in tested spelling achievement. On the average, the accelerated students tested 1.6 grades above the norm. The range between averages for retarded and accelerated students was 3.7 grades. It was interesting to note that the 8B and 7A classes reached the same average grade equivalents in both the total and accelerated classifications. However, this was not true of the retarded and normal 8B's and 7A's.

Grade 8A.—There were 325 units of 8A students tested in the city schools. These included 9,790 cases, an average of 30 cases per unit, and constituted about 12 per cent of all city school students tested in grades 2 to 8. On the average, the state 8A's reached a grade equivalent of 7.4, which was 1.1 grades below the national norm. This average pupil deviation was less than that for 8B's, the same as that for 7B's, but greater than that for all other grade levels.

Only two 8A units reported no retarded pupils. In all, 5,412 students were retarded—about 55 per cent of the tested pupils in this class. These retarded students averaged 2.3 grades below the norm. The normal students numbered 1,687, or 17 per cent of the class, and came from 308 of the 325 units. The accelerated 8A's numbered 2,691, or 28 per cent of the class, and came from 307 of the 325 units. On the average, the accelerated 8A's were 1.8 grades above the norm. The 8A averages for the retarded and accelerated pupils covered a range of 4.1 grades. Thus this grade shared with the 7A's the doubtful distinction of having the widest range between averages for any class.

Summary.—In all, 82,833 city school pupils were tested. These came from 3,547 grade units, which gave an average of 23 pupils per unit. The average sized unit in the A classes was about 25, while that in the B classes was about 15. The A units outnumbered the B units by a little more than 3 to 1, while the pupils in the A units outnumbered those in the B units by almost 5 to 1. No class had an

average pupil deviation which equalled or exceeded the norm for the time of testing. Average pupil deviations in the B classes ranged from —.1 in grade 2B to —1.4 in grade 8B. In the A classes they ranged from —.2 in grade 2A to —1.1 in grade 8A. The average pupil, considering all grades collectively, was .6 grade below the norm.

Of the 3,547 units, 3,428 reported retarded cases. The 40,033 retarded cases averaged 11 cases to the unit and represented 48 per cent of the total cases. The per cent of retarded cases in B classes in each grade ranged from 20 in grade 2B to 69 in 8B, and in A classes it ranged from 37 in grade 2A to 56 in grade 5A. Average grade equivalents for retarded pupils in B classes ranged from —.7 in grade 2B to —2.1 in grade 8B, and those in A classes ranged from —.8 in grade 2A to —2.3 in grade 8A. The average retarded pupil, considering all grades collectively, was 1.5 grades below the norm.

Units reporting normal cases numbered 3,382 of the 3,547, an average of 6 cases per unit. The 22,021 normal cases made up 27 per cent of the total. Normal percentages in the B classes ranged from 11 in grade 8B to 66 in grade 2B, while in A classes they ranged from 17 in both 8A and 7A to 43 in 2B. Five of the 14 half grades had average pupil deviations of 0, 6 had an average deviation of —.1, 1 had an average deviation of —.2, and 1 had an average deviation of +.1. The average normal pupil, considering all grades collectively, had an average pupil deviation .1 grade below the norm, which is probably an indication of positive skewness even within the hypothetically normal limits.

Units reporting at least one accelerated student numbered 3,150 of the 3,547, and averaged 6 pupils per unit. The 20,779 accelerated cases made up 25 per cent of the total cases reported. In the B classes, accelerated percentages ranged from 14 in grade 2B to 24 in grade 4B, and in the A classes, from 20 in grade 2A to 31 in grade 7A. Generally speaking, the percentages accelerated were higher in the A classes than in the B classes. The average pupil deviation in the B classes ranged from 1.0 grade above the norm in grades 2B, 3B, and 4B to 1.9 above in grade 7B. The average pupil deviation in the A classes ranged from .8 grade above the norm for the 2A's to 2.1 above in grades 6A and 7A. The average accelerated pupil, considering all grades collectively, was 1.6 grades above the norm.

If it may be assumed that a normal distribution of cases in spelling achievement would show about 50 per cent normal, about 25 per cent retarded, and about 25 per cent accelerated, then only the accelerated cases approach the normal expectation in this study. It is clearly evident, on the basis of the above assumption, that low achievement in spelling in the city schools of Indiana can be traced to a lack of normal progression of students in this subject, and more especially to a preponderance of retarded pupils.

Figure 4 is a graphic illustration of the progress in spelling achievement of retarded, accelerated, and total cases in B classes. The curves in this figure were plotted to points determined by the average pupil deviation for each class at the time of testing. The solid line in the graph represents normal expectation as determined

by the test norm at each level. If it may be assumed that the same learning factors have been operative for all of the cases in these classes, and that the sampling at each level is truly adequate and representative, then these curves represent in effect the learning curves for accelerated, retarded, and total city school pupils in B grades.

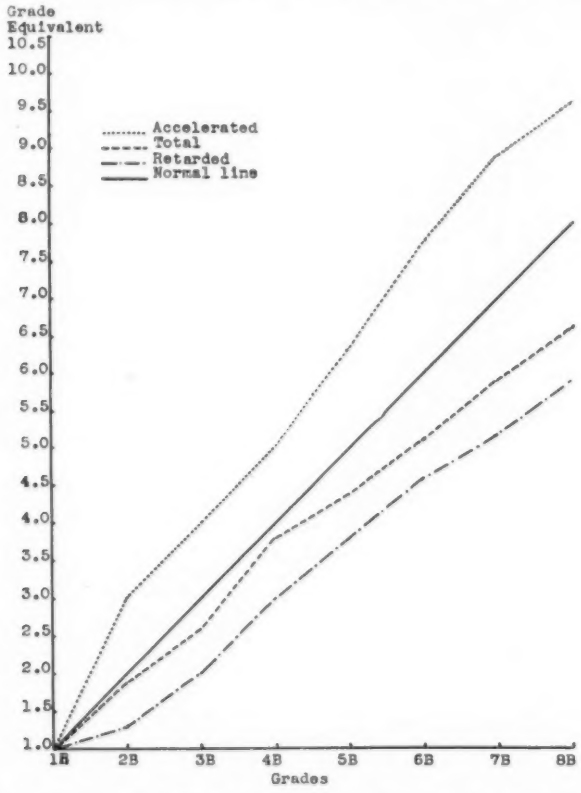

Fig. 4. Progress in spelling achievement of retarded, accelerated, and total cases in B classes

Here is illustrated the fact that, even at the 2B level, wide differences are observable between the averages for retarded and accelerated units, and that these differences gradually increase, reaching the widest point at the 8B level.

The curve for all students collectively starts slightly below the normal line at grade 2B, takes a downward direction toward grade 3B, and attempts an approach to normal at grade 4B, after which a steady decline sets in and continues throughout the remaining levels. The curve for retarded cases starts almost a grade and a half below

the norm at the 2B level, then makes almost steady digression from the norm throughout the remaining levels. The curve for accelerated cases almost parallels the normal line from levels 2B to 4B, then makes a pronounced digression away from the normal line until the 6B level is reached, and then shows a slight tendency to turn toward the normal line in the remaining levels. Overbalanced by the larger percentage of retarded cases, the smaller percentage of accelerated cases has little effect in holding the total case curve near the normal line.

Figure 5 is a graph of progress in spelling achievement of retarded, accelerated, and total cases in the A classes. This graph was plotted to points representing the average pupil deviation at each grade level. Again, the solid line represents the normal expectation at the time of testing. In view of the fact that the A classes are presumed to represent those pupils who are making comparatively normal progress for their chronological age, these curves may be

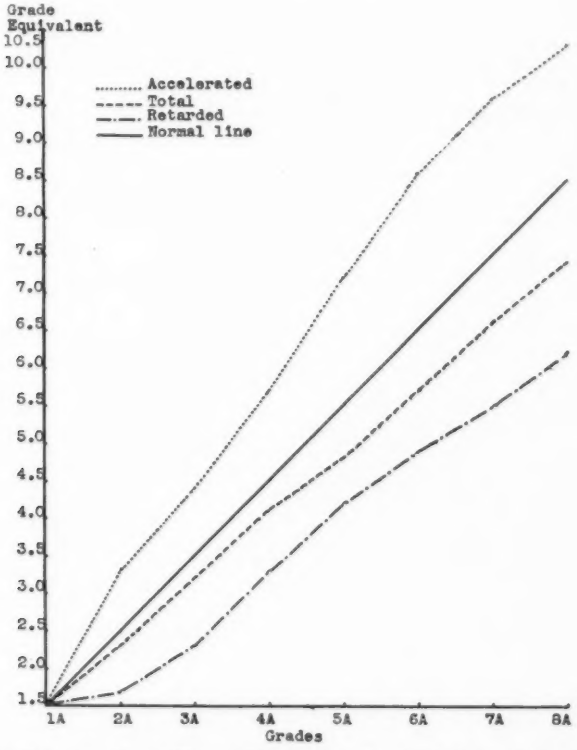

Fig. 5. Progress in spelling achievement of retarded, accelerated, and total cases in A classes

assumed to represent the learning curves for the various groups of city school pupils—this, of course, on the further assumptions that similar factors are operative at the various levels and that the sampling is adequate.

The first thing which meets the eye is the decided general similarity between these curves and those for the B classes. This would seem to be somewhat of a refutation of the theory that B classes in the spring are made up largely of irregular pupils, especially those who have been held back. This may be true from an administrative standpoint, but hardly from the standpoint of tested ability in spelling.

For the retarded cases, the achievement curve shows an accelerated digression from the normal line from the 2A to 3A grade levels, almost parallels the normal line from 3A to 5A, and shows a steady digression away from this line throughout the remaining levels. The total case curve rather closely parallels the normal line until the 4A level is reached, with a rather pronounced digression away from the normal line from 4A to 5A, after which the digression is constant but less pronounced until the 8A level is reached. The curve for accelerated cases nearly parallels the normal curve from levels 2A to 3A, after which there is a decided upturn extending to the 6A level, followed by an increasing tendency to digress toward the normal line until the 8A level is reached.

The practice here of starting all curves at the first grade level may be somewhat misleading. If measurement had extended downward to the first grade level and upward through the high school levels, the curves for both accelerated and retarded cases might closely parallel the typical concave-convex curve which is so prevalent in learning experiments. Data from the testing at high school levels, which is to be considered in a future study, may throw some light on this hypothesis.

Results in Relation to Various Other Factors

It is conceivable that many factors other than the general ability of the students enter into spelling achievement. For this reason, items of data such as school organization, type of commission, size of enrollment, and number of months in the school year were studied in this analysis. The transmittal sheet included a questionnaire from which it was possible to consider other factors which might influence spelling achievement. As has been mentioned earlier, these factors included the number of days spelling is taught each week, number of minutes in the spelling period, time of day when spelling is taught, subject preceding the spelling lesson, participation in spelling contests, type of spelling unit, the way spelling appears in the curriculum, use of pretests, emphasis on checking spelling in written work, use of progress charts, emphasis on rules, systematic reviews, and phonetics, and per pupil cost of instruction.

The percentage method of making comparisons has been employed throughout the remainder of this study. No systematic attempt has been made to check the reliability of differences which appear in the ensuing tables. Numbers are sufficiently large to permit rather broad

generalizations in this respect. Except in the case of a few categories showing an unusually small number of cases, any observable difference in percentages of 2 points or more may generally be considered significant. In the categories which involve a large number of cases, even a difference of 1 per cent is likely to be significant. Any reference to the reliability of these differences will have been considered in light of this general hypothesis.

School Organization.—Table II shows the number and per cent of retarded, normal, and accelerated pupils, distributed according to the organization of grades within the school. The figures show that 73,620 of the original 82,833 cases fell into the four categories under consideration. About twice as many units came from schools having only grades 1 to 6 as came from schools having either grades K to 6 or grades 1 to 8.

TABLE II. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO THE ORGANIZATION OF GRADES WITHIN THE SCHOOL

Organization	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Grades 1-6	1,356	44	12,919	44	8,970	31	7,378	25	29,267	40
Grades K-6	661	21	7,255	50	3,894	27	3,446	23	14,595	20
Grades 1-8	641	21	8,567	52	4,046	24	3,972	24	16,585	22
Junior high only	442	14	7,321	56	2,247	17	3,605	27	13,173	18
Total	3,100	100	36,062	49	19,157	26	18,401	25	73,620	100

The percentages of retarded pupils show that the junior high, with 56 per cent, had the greatest amount of retardation. The grades 1 to 6 organization showed most favorably in this respect. Somewhat balancing this was the fact that the junior high category exceeded other categories in percentage of accelerated students. However, the grades 1 to 6 category showed the highest percentage of normal students. In the seventh and eighth grades, taken as a whole, the percentages of both retarded and accelerated pupils were generally higher than the average percentages for the other 6 grades.[4] Students from these grades make up the junior high school category exclusively. These facts virtually exclude the junior high category (grades 6 to 8) in making comparisons, and may be biasing factors in the interpretation of data from schools organized on a grades 1 to 8 basis. There is almost certainly a reliable difference between schools with the 1 to 6 and the K to 6 organization.

Type of School Commission.—Table III shows the number and percentage of retarded, normal, and accelerated pupils, distributed

[4] See Table I.

according to the type of school commission. About 72 per cent of the units and 69 per cent of the cases reported came from schools having a continuous commission. This seems to indicate that the highest percentage of participation in the study came from the smaller city schools, since the larger city schools almost invariably hold a first-class commission.

TABLE III. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO TYPE OF COMMISSION HELD BY THE SCHOOL

Type of Commission	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
First-Class	768	22	11,513	53	4,821	22	5,359	25	21,693	26
Continuous	2,531	72	26,232	47	15,963	28	14,217	25	56,412	69
Conditional	213	6	1,934	50	1,013	26	954	24	3,901	5
Total	3,512	100	39,679	48	21,797	27	20,530	25	82,006	100

The pupils in the continuous commission category showed less retardation, more normality, and equal or more acceleration in spelling achievement than did pupils from schools holding either the first-class or the conditional commission.

Pupils from schools with continuous commissions showed a percentage advantage of 6 points over those from schools with first-class commissions in both the retarded and the normal groups. Unless there are strong biasing factors not directly observable, this indicates a statistical superiority. Comparatively few cases came from schools with a conditional commission, but the data indicate that pupils in this category were probably slightly inferior to those in the continuous commission category and slightly superior to those in the first-class commission category.

Size of School Enrollment.—Table IV shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the enrollment of the school from whence they came. Tabulation showed that 82,569 of the 82,833 cases were classifiable in this manner. The largest number of units, 28 and 27 per cent, came from schools enrolling 200-299 and 300-449 pupils, respectively. Likewise, the percentage of cases from each of these categories almost doubled the percentage of the next largest category.

Pupils from schools having an enrollment of 50-99, 450-599, and 600 and over showed the heaviest percentages of retarded pupils. The largest schools had the largest percentage of retardation, which ranged as high as 13 percentage points above that in the schools having an enrollment of 1-49. All except the 600 and over schools exhibited about the same percentages of normal cases. Schools in the 50-99 class had the lowest percentage of accelerated students, followed in

TABLE IV. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO SIZE OF ENROLLMENT

Enrollment	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
1-49	68	2	209	44	126	26	141	30	476	1
50-99	227	6	2,695	53	1,328	26	1,051	21	5,074	6
100-149	259	7	2,043	46	1,223	28	1,140	26	4,406	5
150-199	379	11	3,629	45	2,161	27	2,205	28	7,995	9
200-299	974	28	10,979	48	6,248	27	5,600	25	22,827	28
300-449	950	27	10,549	46	6,354	27	6,124	27	23,027	28
450-599	459	13	6,115	50	3,153	26	2,999	24	12,267	15
600 and over	217	6	3,730	57	1,355	21	1,412	22	6,497	8
Total	3,533	100	39,949	48	21,948	27	20,672	25	82,569	100

order by those with enrollments of 600 and over, 450-599, 200-299, 100-149, 300-449, 150-199, and 1-49.

It may be highly significant that the lowest percentage of retarded pupils and the highest percentage of accelerated pupils were found in schools with an enrollment of 1-49. However, the small number of cases in this category makes it advisable to avoid generalizing too widely. It is almost certainly evident that the poorest spellers come from schools with enrollments of 50-99 and of 450 and over. Aside from the schools with an enrollment of 1-49, the size of school most conducive to good spelling achievement appears to be either that with 100-199 or with 300-449 pupils.

Length of the School Year.—Table V shows the number and percentage of retarded, normal, and accelerated students, distributed according to the number of months in the school year. It was possible to classify 82,223 of the 82,833 cases into categories under this topic. About three fourths of the units, as well as three fourths of the cases

TABLE V. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO NUMBER OF MONTHS IN THE SCHOOL YEAR

Number of Months	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
8 and 8¼	177	5	2,003	45	1,190	26	1,281	29	4,474	5
8½	22	1	312	47	191	29	155	24	658	1
9 and 9¼	2,677	76	29,118	47	16,850	27	15,718	26	61,686	75
9½ and 10	636	18	8,314	54	3,619	23	3,472	23	15,405	19
Total	3,512	100	39,747	48	21,850	27	20,626	25	82,223	100

reported, had school years of 9 and 9¼ months. The next largest category was that of schools with a 9½- or 10-month year.

The highest percentage of retarded pupils appeared in the category of schools with a 9½- or 10-month school year. Also, this percentage appeared to be significantly the highest. The lowest percentage of retarded pupils, a percentage that is likewise significant, was exhibited in the 8- and 8¼-month category. These categories also presented reversed percentages of accelerated cases. It may be true, as many educators postulate, that a longer school year contributes to greater development in extrinsic and less measurable outcomes of education. But one thing seems fairly certain, spelling achievement as measured by tests is not benefited by the longer term.

Number of Days Spelling Is Taught Each Week.—Table VI shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the number of days spelling is taught each

TABLE VI. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO NUMBER OF DAYS SPELLING IS TAUGHT EACH WEEK

Number of Days	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
1	158	5	2,637	58	789	17	1,140	25	4,566	6
2	146	4	2,335	56	684	17	1,134	27	4,153	6
3	360	11	4,897	52	1,944	20	2,622	28	9,463	12
4	263	8	3,104	50	1,462	23	1,715	27	6,281	8
5	2,369	72	23,390	45	15,979	31	12,515	24	51,884	68
Total	3,296	100	36,363	48	20,858	27	19,126	25	76,347	100

week. Information on this aspect was available for 76,347 of the cases, and for 3,296 of the 3,547 units. Slightly more than two thirds of the number of cases were taught spelling 5 days a week. The other possibilities were tabulated as follows: 12 per cent of the cases had spelling 3 days each week, 8 per cent had it 4 days, 6 per cent 2 days, and 6 per cent 1 day each week.

Those who had spelling 5 days a week had the smaller percentage of retarded cases. In fact, the percentages of retarded cases appeared to rise significantly as the number of days per week was diminished. A reverse of this tendency was noted in tabulations of normal cases. Schools having spelling 1 day or 2 days each week showed about the same percentage of normal pupils, but this was only a little more than half the percentage of those having spelling 5 days a week. There was not such variability in the tabulations of accelerated pupils. Those having spelling 5 days a week had the lowest percentage of accelerated cases. Regardless of this fact, the 5-day-a-week pupils showed a much more balanced distribution of ability than did those in any other category.

We must conclude, then, that spelling achievement is furthered as the number of days it is taught each week is increased.

Number of Minutes in the Spelling Period.—Table VII shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the average number of minutes in the spelling period. Data on this item were available for 75,391 cases, found in 3,256 of the 3,547 units. The tabulations showed that about 2 in 5 of the pupils had a 20-minute period in spelling, about 1 in 5 had a 15-minute period, and 1 in 5 had a 30-minute period.

Those with a 20-minute period showed the lowest percentage of retarded pupils and the highest percentage of normal pupils, and were exceeded only slightly in percentage of accelerated pupils by those with a period of 40 minutes or more. Those with a 15-minute or a 30-minute period each showed somewhat less efficient achievement than those with 20-minute period. The poorest records were made by those with a 5-minute period, followed by those with a period of more than 40 minutes and those with a 10-minute period. Since there were only 2 out of 5 pupils reported with a 20-minute period, it follows that units having less than a 20-minute period might profitably increase the time to this amount, and units devoting more than this amount of time might profitably spend some of the spelling time on other activities.

TABLE VII. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO THE AVERAGE NUMBER OF MINUTES IN THE SPELLING PERIOD

Number of Minutes	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
5	17	1	384	66	94	16	108	18	586	1
10	144	4	2,006	54	805	22	892	24	3,703	5
15	714	22	7,269	48	4,101	27	3,695	25	15,065	20
20	1,319	43	14,030	45	9,333	30	7,947	25	31,310	41
30	687	21	7,912	48	4,553	28	4,009	24	16,474	22
40	191	6	2,717	51	1,159	22	1,411	27	5,287	7
More than 40	113	3	1,678	57	514	17	774	26	2,966	4
Total	3,256	100	35,996	48	20,559	27	18,836	25	75,391	100

Time of Day for Spelling.—Table VIII shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the time of day spelling is taught. Data were available for 75,498 cases, in 3,272 units. The school day was classified roughly into four quarters. Practice indicated that about one fourth of the pupils had spelling sometime in each of the first three quarters, while in the other fourth they fell either into the fourth quarter or had a period which varied in time from day to day.

On the basis of the tabulations, the variable time for the spelling lesson showed the poorest achievement results, followed rather closely by the last quarter of the day, and then by the first period of the day. There appeared little difference in spelling achievement when

TABLE VIII. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO TIME OF DAY WHEN SPELLING IS TAUGHT

Time of Day	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
8:00-10:00	800	24	8,964	49	4,879	26	4,650	25	18,493	25
10:00-12:00	968	30	9,742	46	6,260	30	5,133	24	21,135	28
1:00- 2:30	810	25	8,338	45	5,335	29	4,760	26	18,433	24
2:30- 4:00	423	13	4,888	50	2,360	24	2,545	26	9,793	13
Time varies	271	8	3,919	51	1,868	25	1,857	24	7,644	10
Total	3,272	100	35,851	47	20,702	28	18,945	25	75,498	100

the period fell between 10 a.m. and 12 m. or between 1 and 2:30 p.m. Percentages for both retarded and normal units studying spelling during these two quarters of the day differed significantly from those in the other categories. These results are not incompatible with other psychological research, which has shown that there is a warm-up period early in the day which is not conducive to maximum learning, and that the last part of the day finds the pupil somewhat affected by pseudo or actual fatigue. These facts do not, however, account for the low achievement which accompanies the variable time for the spelling period.

The Subject Preceding Spelling.—Table IX shows the number and percentage of pupils, distributed according to the subject preceding spelling. On this item, data were available for 69,916 of the 82,833 cases and for 3,065 of the 3,547 units. The tabulations showed that 14,411, or 21 per cent of those reported, had spelling the first thing in the day. Reading preceded spelling in 18 per cent of the cases, other language arts in 13 per cent, mathematics in 13 per cent, and social studies in 10 per cent. In 15 per cent of the cases the preceding subject varied. Other preceding subjects, in order of percentage, were: health and safety, science, physical education, and music.

Spelling achievement appeared at its highest level when the preceding subject was reading, other language arts, or mathematics. There were only minor percentage differences in these 3 categories when retarded, normal, and accelerated pupils were considered collectively. The health and safety category exhibited about the same trends, but the sampling was small in comparison to the other categories. The highest percentages of retarded pupils were evident when the preceding subject was social studies and when the preceding subject varied. When physical education was a preceding subject, spelling

showed about the same percentage of retarded cases, but again the sampling was small.

Next in size of percentage of retarded cases was the category which showed spelling as the first subject in the day. This is not surprising in view of the results in relation to time of day for the spelling period, which showed a disadvantage when spelling was taught in the early part of the day. Of course, the data did not disclose which factor was operating, or whether either was the sole causal factor, but it is safe to assume, in view of previous psychological research, that the time of day was the more important.

TABLE IX. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO SUBJECT PRECEDING THE SPELLING LESSON

Subject	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Reading	578	19	5,720	45	4,178	32	2,891	23	12,789	18
Other language arts	415	14	3,983	45	2,650	30	2,289	25	8,922	13
Mathematics	420	14	4,165	46	2,722	30	2,231	24	9,118	13
Social studies	324	10	3,559	51	1,548	22	1,845	27	6,952	10
Health and safety	58	2	633	45	385	27	401	28	1,419	2
Science	38	1	479	48	238	24	282	28	999	1
Physical education	56	2	590	50	339	29	251	21	1,180	2
Music	150	5	1,643	47	993	28	897	25	3,533	5
None	623	20	7,081	49	3,616	25	3,714	26	14,411	21
Various subjects	403	13	5,291	50	2,610	25	2,692	25	10,593	15
Total	3,065	100	33,144	47	19,279	28	17,493	25	69,916	100

It is difficult to attempt to account for the fact that the percentage of retardation was so large when social studies preceded the spelling lesson, especially in view of the fact that most studies have reported a high correlation between social studies and reading ability. It may be that some biasing factor not directly observable in these data was operative, since the size of the sampling almost overrules the effect of any chance factors.

Participation in Spelling Contests.—Table X shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the amount of participation in spelling contests. Data on this were reported for 69,466 pupils, who came from 3,003 of the 3,547 groups. About 86 per cent of these pupils had not participated in any contests. The percentage of retarded cases among the 9 per cent who had participated in local contests exceeded by 2 points that for all cases in the study. Also, there were fewer normal pupils in the local contest category. Those who had participated in county and other contests exhibited some advantage over those who had had no contest experience. Although the number of cases was very small, those who had regional contest experience showed a decided advantage

TABLE X. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO PARTICIPATION IN SPELLING CONTESTS

Contest	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Local	241	8	3,030	50	1,350	22	1,711	28	6,091	9
County	38	1	480	46	257	24	315	30	1,052	2
Regional	11	1	94	40	47	20	94	40	235	--
Other	95	3	1,013	45	569	25	660	30	2,242	3
None	2,618	87	28,746	48	16,651	28	14,449	24	59,846	86
Total	3,003	100	33,363	48	18,874	27	17,229	25	69,466	100

not only over those with no contest experience, but also over those with other types of contest experience. So few had had any contest experience that it was difficult to draw definite conclusions from these data. The trends indicated suggest the need for more investigation under more rigid control.

Type of Spelling Unit.—Table XI shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the type of spelling unit employed as a teaching procedure. Data were available for 3,077 units and 71,036 cases. Because of the fact that extremely small numbers of cases were reported as using any other than the daily or weekly unit, no other unit types were considered.

TABLE XI. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO TYPE OF SPELLING UNIT

Type of Spelling Unit	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Daily	658	21	6,359	45	4,238	30	3,640	25	14,237	20
Weekly	2,419	79	27,430	48	15,328	27	14,041	25	56,799	80
Total	3,077	100	33,789	47	19,566	28	17,681	25	71,036	100

Those learning by the daily unit method, when compared with those learning by the weekly unit method, showed a significantly smaller percentage of retarded cases, and a significantly larger percentage of normal cases, while the accelerated cases were relatively the same. Thus, the daily unit appeared to have an advantage over the weekly unit, regardless of the fact that the number of pupils studying under the weekly unit plan exceeded the number studying under the daily unit plan by about 4 to 1.

How Spelling Is Taught.—Table XII shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the way spelling appears in the curriculum. The 77,497 cases reporting data on this aspect came from 3,342 of the 3,547 units. About 81 per cent of these units and 77 per cent of the cases reported that spelling was taught as a separate subject. This difference in percentage of units and percentage of cases leads to the assumption that the practice of teaching spelling as a separate subject prevailed in the lower grades rather than in the upper grades under consideration here, since the average number of cases per unit in the upper grades was generally higher than that in the lower grades. On the basis of this assumption, it would be expected that there would be fewer retarded spellers where the subject is taught separately, since the gross results showed increased retardation at the upper grade levels.

TABLE XII. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO THE WAY SPELLING APPEARS IN THE CURRICULUM

How Taught	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
As separate subject....	2,707	81	27,172	45	17,621	30	15,074	25	59,867	77
With language arts	214	6	2,875	52	1,378	25	1,308	23	5,561	7
With English	361	11	5,977	58	1,697	16	2,671	26	10,345	14
With other subjects	60	2	1,049	61	303	17	372	22	1,724	2
Total	3,342	100	37,073	48	20,999	27	19,425	25	77,497	100

When spelling was taught as a separate subject, there was a significantly lower percentage of retarded pupils and a significantly higher percentage of normal students. The percentage of accelerated pupils was slightly less when spelling was taught as a separate subject than when it was taught in connection with English. Other comparisons of accelerated percentages were favorable to the separate subject method. In the light of the assumption made above, it may be that other biasing factors were operating in these results.

Use of Pretests.—Table XIII shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the use or non-use of pretests.

The 72,356 cases for whom this item was checked came from 3,127 of the 3,547 units. About 69 per cent of the units and 68 per cent of the cases were reported as taught by the pretest method.

Forty-eight per cent of the pupils who had been pretested were retarded and 25 per cent were accelerated, as compared with 49 per cent and 24 per cent in these categories, respectively, for those who had had no pretests. Percentages of normal students were the same for each category. This showed some advantage in tested achievement

TABLE XIII. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO USE OR NON-USE OF PRETESTS

Use of Pretest	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Yes	2,145	69	23,442	48	13,292	27	12,504	25	49,238	68
No	982	31	11,232	49	6,241	27	5,645	24	23,118	32
Total	3,127	100	34,674	48	19,533	27	18,149	25	72,356	100

when the pupils were pretested, but the advantage was not great enough to conclude that one method is much superior to the other.

Checking of Spelling in Written Work.—Table XIV shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to emphasis on checking spelling in written work. The 75,103 cases for whom this item was checked came from 3,231 of the 3,547 units. About 64 per cent of the units and 60 per cent of the cases had had spelling checked in all written work. Only 425 cases reported spelling checked in no written work, so this category was omitted from the table. The fact that 40 per cent of the cases, coming from only 36 per cent of the units, had spelling checked only in part of the written work, combined with the previous observation that the upper grade levels contained the larger sized units, may indicate that the practice of checking all written work was more prevalent in the lower grades.

TABLE XIV. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO EMPHASIS ON CHECKING SPELLING IN WRITTEN WORK

Amount of Spelling Checked	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
All written work	2,052	64	20,776	46	13,384	29	11,171	25	45,331	60
Some written work	1,179	36	15,252	51	6,891	23	7,629	26	29,772	40
Total	3,231	100	36,028	48	20,275	27	18,800	25	75,103	100

The data show that, for those who had had all written work checked, 46 per cent were retarded, 29 per cent were normal, and 25 per cent were accelerated in tested spelling achievement. When only some of the written work was checked, 51 per cent of the pupils were retarded, 23 per cent were normal, and 26 per cent accelerated. These results clearly indicate that the practice of checking all written work was distinctly advantageous to proficiency in spelling.

Use of Progress Charts.—Table XV shows the number and percentage of retarded, normal, and accelerated students, distributed according to whether or not progress charts were used as a teaching procedure. About 4 in 10 of the 71,304 pupils for whom this item was checked had had an opportunity to observe their spelling progress by this method. These cases came from 3,081 of the 3,547 units.

TABLE XV. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO USE OR NON-USE OF PROGRESS CHARTS

Use of Charts	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Yes	1,286	42	13,586	47	8,061	28	7,090	25	28,737	40
No	1,795	58	20,567	48	11,218	27	10,782	25	42,567	60
Total	3,081	100	34,153	48	19,279	27	17,872	25	71,304	100

The pupils whose spelling progress was motivated by charts showed about 1 per cent advantage in both the number retarded and the number normal over those for whom no charts had been prepared. The percentage of accelerated pupils was the same in each category. This would seem to indicate that progress charts are an aid to achievement, but the data are probably not statistically conclusive.

Emphasis on Rules.—Table XVI shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to emphasis on rules as a teaching procedure. This item was checked for 73,037 cases coming from 3,143 of the 3,547 units reported. The comparatively close consistency between percentages of cases and percentages of units in the classifications would seem to indicate that the sampling on this item was truly cross-sectional. The most popular procedure appeared to be that of emphasizing rules as they apply.

TABLE XVI. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO EMPHASIS ON RULES

Emphasis on Rules	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
No rules	105	3	1,275	54	676	29	396	17	2,347	3
General rules	674	22	7,568	49	3,821	25	4,127	26	15,516	21
Rules only as they apply	2,050	65	22,841	47	13,266	28	11,959	25	48,066	66
Few rules	215	7	2,490	51	1,224	25	1,160	24	4,874	7
Many rules	99	3	996	44	619	28	619	28	2,234	3
Total	3,143	100	35,170	48	19,606	27	18,261	25	73,037	100

About 2 out of 3 pupils were placed in this category. Those for whom general rules were stressed made up the next largest percentage, representing about 1 in 5 cases. About 7 in 100 were given few rules to remember, while the remaining 6 per cent of the total were equally divided between those for whom no rules were stressed and those for whom many rules were stressed.

An examination of the percentages of retarded cases shows a distinct hierarchy in arrangement, as the categories range from emphasis on many rules to emphasis on no rules. However, the normal percentages did not display any such consistency, for the highest percentage occurred when no rules were emphasized. The consistency appeared once more in the case of accelerated students, where an 11-point difference in percentages was observed between the many rules and the no rules categories. The data indicate that the emphasis of many rules coincides with best spelling achievement, followed by emphasis on rules as they apply. When no rules were emphasized, tested achievement reached its lowest level.

Emphasis on Reviews.—Table XVII shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to emphasis on systematic reviews as a teaching procedure.

TABLE XVII. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO EMPHASIS ON SYSTEMATIC REVIEWS

Emphasis	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Yes	2,426	74	26,466	47	15,085	27	14,566	26	56,117	74
No	143	4	1,776	51	874	25	854	24	3,504	5
Some, but not systematized	708	22	8,139	50	4,595	28	3,686	22	16,420	21
Total	3,277	100	36,381	48	20,554	27	19,106	25	76,041	100

The 76,041 pupils for whom data were available on this item came from 3,277 of the 3,547 units. About 3 in 4 pupils were reported as having been subjected to systematic reviews; about 1 in 5 were given some reviews, but the reviews were not systematized; and only 5 per cent of the pupils had had no reviews.

Those who had had systematic reviews showed 4 per cent less retardation than those who had had no reviews and 3 per cent less than those who had had some unsystematized reviews. This result, coupled with observations of the normal and accelerated percentages, leads to the conclusion that spelling achievement is benefited by systematic review but that reviews which are unsystematized are scarcely more effective than no reviews at all.

Emphasis on Phonetics.—Table XVIII shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to emphasis on phonetics as a teaching procedure. The 64,304 cases which checked this item came from 2,824 of the 3,547 units. About 69 per cent of the pupils were listed as having had phonetics moderately stressed and 21 per cent as having had it heavily stressed. In only 10 per cent of the cases were phonetics not stressed at all.

None of the related factors studied showed such conclusive differences as the factor of stress on phonetics, for 36 per cent retardation was observed for those who had had heavily stressed phonetics, 48 per cent who had had it moderately stressed were retarded, and as much as 57 per cent retardation appeared for those who had had no stressing of phonetics. About 34 per cent of those who had had phonetics heavily stressed, 28 per cent who had had it moderately stressed, and 19 per cent who had not had it stressed were listed as normal cases. Those who had had phonetics heavily stressed had an advantage of 6 percentage points in accelerated cases over either of the other two categories. These data appear to prove conclusively the advantage in spelling proficiency when phonetics are heavily stressed in the spelling lesson.

TABLE XVIII. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO EMPHASIS ON PHONETICS

Amount of Emphasis on Phonetics	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Heavily stressed	640	23	4,942	36	4,588	34	4,055	30	13,585	21
Moderately stressed	1,936	68	21,415	48	12,681	28	10,471	24	44,567	69
Not stressed at all	248	9	3,486	57	1,198	19	1,468	24	6,152	10
Total	2,824	100	29,843	46	18,467	29	15,994	25	64,304	100

Per Pupil Cost of Instruction.—Table XIX shows the number and percentage of retarded, normal, and accelerated pupils, distributed according to the per pupil cost of instruction. These data include 82,683 of the original 82,833 cases and 3,539 of the original 3,547 units. About 29 per cent of the cases, the largest group, fell in the $80 to $89 interval. By far the majority of cases had a per pupil cost of instruction ranging from $70 to $129. The cases above this range were so infrequent that the size of the interval was arbitrarily increased. Because of the very few cases in the extremes of the distribution, it seemed appropriate to exclude the intervals below $60 and above $159 in considering the data. An illustration of the danger of generalizing where the cases are extremely small is evident in the $40 to $49 interval. These cases came from 7 units in 1 school, having the lowest per pupil cost of instruction of any city school in

TABLE XIX. NUMBER AND PER CENT OF RETARDED, NORMAL, AND ACCELERATED PUPILS, DISTRIBUTED ACCORDING TO PER PUPIL COST OF INSTRUCTION

Per Pupil Cost	Units Reporting		Retarded Pupils		Normal Pupils		Accelerated Pupils		Total Pupils	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
$ 40-49	7	--	25	19	34	25	76	56	135	--
50-59	30	1	238	31	216	29	306	40	760	1
60-69	124	4	1,553	49	840	27	761	24	3,154	4
70-79	360	10	3,896	46	2,283	27	2,304	27	8,483	10
80-89	1,029	29	11,872	50	6,324	27	5,493	23	23,689	29
90-99	637	18	6,761	46	4,073	28	3,812	26	14,646	18
100-109	348	10	3,799	44	2,362	27	2,494	29	8,655	10
110-119	283	8	4,135	56	1,792	25	1,407	19	7,334	9
120-129	460	13	5,087	54	2,162	23	2,102	23	9,351	11
130-159	205	6	2,002	39	1,549	30	1,600	31	5,151	6
160-199	36	1	363	43	214	25	276	32	853	1
200 and over	20	--	216	46	137	29	119	25	472	1
Total	3,539	100	39,947	48	21,986	27	20,750	25	82,683	100

the state, yet they had the best tested record of achievement of any interval in the table.

A general examination of the principal categories ($60 to $159) showed the lowest percentage of retardation to be in schools with a per pupil instruction cost of $130 to $159, followed by those in the $100 to $109 class. There appeared to be no direct relationship, however, between increasing expenditure per pupil and decreasing percentage of retardation. Those in the $130 to $159 class also showed the highest percentage of both normal and accelerated cases, with the same lack of relationship existing in the categories on the whole as that exhibited for retarded pupils. The conclusion follows, then, that cost of instruction may have something to do with spelling proficiency as measured by standardized tests, but that the relationship is not too well established.

Summary.—To attempt to single out the salient points that this part of the research has uncovered would be redundant, in so far as each point appears in the final summary and conclusions. Suffice it to say, that some of the factors point to conclusions which are compatible with popular opinion, while others show remarkable incompatibility not only with opinion but with other research findings. It would not be unusual to find that some biasing elements are operative in at least some of the methods of tabulation here employed. One is constantly aware of the fact that the throwing together of masses of cases at different grade levels may obscure or even distort the true picture of conditions as they really exist. But the mass of data itself must lead to a realization that many of the findings here disclosed are more than likely to be reliable and valid. In all cases of doubt, it can only

be hoped that this research will serve to initiate more research and experimentation, so that ultimately, and especially under more rigid controls, the truth will be revealed and established.

If there is one consistency in the tables in this section of the report, it is the consistency with which percentages of accelerated pupils tend to be comparatively unvariable from table to table. This can surely be interpreted as an indication that bright students will do superior work, regardless of conditions or circumstances.

SUMMARY AND CONCLUSIONS

The 1944-1945 Indiana State Testing Program had as its principal project the testing of spelling in all grades from 2 to 12, and in all public and parochial schools in the state. Participation in the project was voluntary, a policy long established in state testing. No state testing project has been accepted with more interest and enthusiasm. One group, the Catholic parochial schools, participated 100 per cent, and the size of the sample in other types of schools was entirely adequate to assure complete validity in the results in so far as the test used actually measures spelling proficiency.

The test used was the Stanford Achievement Test Spelling List, Form H. Various levels of this test were employed, as stipulated, for the various grades. The tenth, eleventh, and twelfth grades were given the ninth grade test, since no form is published for these upper levels. Testing, grading, and transmittal of results were the responsibility of the individual teachers, under the supervision of superintendents and principals.

In general, three types of pupils were considered in studying the results: retarded, normal, and accelerated. The criterion for a normal student required that his grade equivalent should not fall more than .4 grade above or below his normally expected grade equivalent at the time of testing (February 9, 1945). Those whose grade equivalents fell below these limits were regarded as retarded, those above as accelerated.

The present report covers grades 2 to 8 in the city schools of the state. Learning curves and norms were developed for city school pupils in these grades. Results were tabulated in relation to various items of available data, and the following conclusions were drawn:

1. At no grade level did the average pupil deviation for all students equal or exceed the norm for the date of testing.
2. On the average, the city school pupils were .6 grade below the norm in tested spelling achievement.
3. On the average, the retarded pupils were 1.5 grades below the norm.
4. On the average, the accelerated pupils were 1.6 grades above the norm.
5. Twenty-five per cent of all city school pupils were accelerated; only 27 per cent were normal; and 48 per cent were retarded. This clearly demonstrates that the subnormal position of the average pupil was due to the unusually large number of retarded pupils and the unusually small number of normal pupils.

6. As a general trend, the percentage of retarded pupils tended to increase at the higher grade levels while the percentages of normal and accelerated pupils tended to decrease.

7. The learning curves for spelling tended to approximate a straight line for the total group, but to take the shape of the typical concave-convex curve in the case of both retarded and accelerated pupils.

8. Pupils from schools housing only grades 1 to 6 were definitely superior to those from schools which had a kindergarten grade in addition, and were probably superior to those housing all grades from 1 to 8. Therefore, kindergarten training did not appear to benefit tested spelling achievement.

9. Pupils from schools operating under a continuous commission appeared to be better than those from schools operating under a first-class commission.

10. Those schools having an enrollment of 50 to 99 and 450 and over had the poorest spelling achievement. Best achievement was found in schools with an enrollment of 1 to 49, 100 to 199, and 300 to 449.

11. Spelling achievement appeared not to be benefited by a longer school year.

12. It seemed that an increase in the number of days per week spelling was taught was accompanied by an increase in achievement.

13. The 20-minute period seemed to show best results in spelling achievement. The 5- and 10-minute periods, as well as periods of 40 minutes and over, showed statistically poorer achievement than did other length periods.

14. The best tested spelling achievement was evidenced when the spelling period came between 10 a.m. and 12 m. and 1 to 2:30 p.m. Poorest achievement was made by those whose spelling period varied in time from day to day.

15. Spelling achievement appeared best when the preceding subject was reading, other language arts, mathematics, or health and safety. Poorest achievement appeared to be associated with social studies as a preceding subject.

16. The data on the effect of spelling contests on achievement were not conclusive, but there was some indication that participation in contests accompanied better achievement.

17. The daily unit seemed to be more effective than the weekly unit as a teaching procedure.

18. Tested spelling proficiency was much better when spelling was taught as a separate subject than when it was included with other subjects.

19. The use of pretests in the teaching of spelling was associated with better tested achievement, but the advantage was not large enough to insure statistical reliability.

20. It was clearly indicated that the practice of checking spelling in all written work led to much better tested achievement records than the practice of checking it in only some of the written work.

21. The use of progress charts as a teaching procedure showed to some advantage in tested spelling achievement, but differences were probably not large enough to be statistically reliable.

22. Tested spelling proficiency was best when many rules had been emphasized as a teaching procedure and worst when no rules had been emphasized. Next to emphasizing many rules, the procedure of emphasizing rules as they apply appeared best.

23. Systematic reviews had a decided effect on bettering spelling proficiency, but unsystematized reviews were no more effective than no reviews.

24. The data appeared to prove conclusively that the stressing of phonetics increases spelling proficiency.

25. Per pupil cost of instruction showed little direct relationship with success in measured spelling ability, but those cases in which the per pupil cost was $130 to $159 showed significantly higher scores than did those in other cost categories.

26. The consistency of percentages of accelerated pupils, regardless of the related factor being studied, seemed to lend emphasis to the conclusion that bright students will do superior work under any and all circumstances.

A List of Bulletins in the Field of Education, Indiana University

By Kathleen Dugdale

The School of Education at Indiana University has published the following bulletins. All of these may be obtained from the University Bookstore for 50 cents postpaid unless otherwise noted.

Proceedings of the High School Principals' Conference (November 23 and 24, 1923). Vol. I, No. 1, 1924. 85 p. (Supply exhausted.)

Investigation of Nursing as a Professional Opportunity for Girls, Part I, Technical Study; Part II, Vocational Information Bulletin. By Florence E. Blazier. Vol. I, No. 2, 1924. 69 p.

Proceedings of the Eleventh Conference on Educational Measurements. Vol. I, No. 3, 1925. 141 p.

Proceedings of the High School Principals' Conference (November 14 and 15, 1924). Vol. I, No. 4, 1925. 49 p. (Supply exhausted.)

First Revision of the Bibliography of Educational Measurements. Compiled by the Bureau of Cooperative Research. Vol. I, No. 5, 1925. 147 p. (Supply exhausted.)

Proceedings of the Twelfth Conference on Educational Measurements. Vol. I, No. 6, 1925. 76 p.

The Effect of Population upon Ability to Support Education. By Harold F. Clark. Vol. II, No. 1, 1925. 28 p.

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A Cross-Indexed Bibliography on School Budgets. By Harold F. Clark. Vol. II, No. 3, 1926. 66 p.

A Comparison of the Results Made on Certain Standardized Tests by Pupils in the Bloomington High School Who Were Taught in Classes of the Same Grade by University Student Teachers and by Regular High School Teachers. By Carl G. F. Franzén. Vol. II, No. 4, 1926. 19 p.

Proceedings of the Thirteenth Annual Conference on Educational Measurements. Vol. II, No. 5, 1926. 103 p.

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Index Numbers in School Administration. By Harold F. Clark. Vol. III, No. 3, 1927. 35 p.

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Some Phases of the Junior College Movement. By I. Owen Foster, Harold F. Clark, Willard W. Patty, and Leo M. Chamberlain. Vol. IV, No. 1, 1927. 125 p. (Supply exhausted.)

Second Revision of the Bibliography of Educational Measurements. By Henry Lester Smith and Wendell William Wright. Vol. IV, No. 2, 1927. 251 p. (75¢)

Bibliography of School Buildings, Grounds, and Equipment, Part I. By Henry Lester Smith and Leo Martin Chamberlain. Vol. IV, No. 3, 1928. 326 p. (75¢)

Proceedings of the High School Principals' Conference (November 18 and 19, 1927). Vol. IV, No. 4, 1928. 54 p.

The Economic Effects of Education. By Harold F. Clark. Vol. IV, No. 5, 1928. 39 p.

Proceedings of the Fifteenth Annual Conference on Educational Measurements. Vol. IV, No. 6, 1928. 73 p.

Proceedings of the Fifth Annual Conference on Elementary Supervision. Vol. V, No. 1, 1928. 54 p.

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Tentative Program for Teaching World Friendship and Understanding in Teacher Training Institutions and in Public Schools for Children Who Range from Six to Fourteen Years of Age. By Henry Lester Smith and Sherman Gideon Crayton. Vol. V, No. 5, 1929. 54 p.

Proceedings of the Sixteenth Annual Conference on Educational Measurements. Vol. V, No. 6, 1929. 96 p.

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The Philosophy of Human Relations: Individual and Collective—A Source Book. By Henry Lester Smith and Harold Littell. Vol. VII, No. 3, 1931. 326 p. (75¢)

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Bibliography of School Surveys and of References on School Surveys. By Henry Lester Smith and Edgar Alvin O'Dell. Vol. VIII, Nos. 1 and 2, 1931. 212 p. (75¢)

Proceedings of the Nineteenth Annual Conference on Educational Measurements. Vol. IX, No. 1, 1932. 139 p.

Bibliography of School Buildings, Grounds, and Equipment—Part II. By Henry Lester Smith and Forest Ruby Noffsinger. Vol. IX, No. 2, 1933. 182 p.

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A Brief Summary of Literature on Leadership. By Henry Lester Smith and Levi McKinley Krueger. Vol. IX, No. 4, 1933. 80 p.

Proceedings of the Twentieth Annual Conference on Educational Measurements. Vol. X, No. 1, 1933. 98 p.

Bibliography of College and University Buildings, Grounds, and Equipment. By Henry Lester Smith and Forest Ruby Noffsinger. Vol. X, No. 2, 1934. 199 p. (75¢)

Factors Affecting the Organization of School Attendance Units. By Raleigh Warren Holmstedt. Vol. X, No. 3, 1934. 32 p.

The Old World Historical Background of Religious and Moral Education in Schools. By Henry Lester Smith, Robert Stewart McElhinney, and George Renwick Steele. Vol. X, No. 4, 1934. 144 p.

Proceedings of the Twenty-first Annual Conference on Educational Measurements. Vol. XI, No. 1, 1934. 96 p.

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